

## CHAPTER 4

### HELIPAD LIGHTING SYSTEM FOR VISUAL FLIGHT RULES

---

#### 4-1. General design

Figures 4-1 through 4-6 and the design criteria set forth herein are intended to serve as a guide in designing and installing a typical helipad lighting system conforming to VFR operation requirements, and consisting of perimeter lights as the basic and only mandatory part of the overall lighting system, with permissive use of landing direction lights and approach direction lights. Also, additional permissive parts of the overall system, are the aids to depth perception helipad floodlights. Components of the system listed as permissive will be justified to and approved by HQUSACE, CEMP-ET, WASH DC 2031-1000. "Permissive" is defined, for the purpose of the lighting system, as: "The lights need not be installed as part of the helipad lighting system, but if installed, then they shall be installed to meet the criteria below." These systems normally will be provided for a helipad with sides 100 feet long, having 25-foot wide shoulders on each side of the helipad, and consist of medium intensity elevated and semiflush light fixtures.

#### 4-2. Electric service

The preferred source of power will be the local electrical distribution system, with dependable low voltage secondary service distributed to the helipad equipment vault. The lighting system normally will be a multiple system, served at 120 volts from a source of 120/240-volts, single phase, 60 hertz, or from a source of 120/208-volts, three phase, 60 hertz.

#### 4-3. Description of helipad lighting

*a. Perimeter lighting system.* The perimeter lighting system will consist of aviation yellow incandescent lights placed around the perimeter of the helipad with a light fixture installed at each corner and three additional lights equally spaced between the lights at the corners on each side of the helipad as shown in figure 4-1. Lights on opposite sides of the helipad should be opposite each other, equidistant from, and parallel to the extended centerlines of the helipad. Lights normally should be placed adjacent to the edge of the helipad paving. Perimeter lights as described herein are mandatory whenever the helipad is to be lighted. The perimeter lights will normally be of the elevated type except where damage may occur due to wheel mounted helicopters being taxied off the helipad. In these cases, semiflush lights will be in-stalled. All perimeter lights installed in the paved shoulders will be mounted on metal light bases. The elevated lights will be as light and frangible as is practicable and the overall height above grade kept to a minimum, but in no case exceeding 14 inches. If snow accumulations of 12 inches or more will be frequent,

mounting height may be increased to not more than 24 inches above grade.

*b. Landing direction lighting system.* The landing direction lighting system, where provided, will consist of aviation yellow incandescent light fixtures installed in a straight line along one or more of the extended centerlines of the helipad, perpendicular to the perimeter lights as shown in figure 4-2. Each row of lights (light bar) will consist of six light fixtures spaced 15 feet on centers with the innermost light located 25 feet from the centerline of the row of perimeter lights. Where the need for additional aid in landing direction visual guidance is required or would aid in the final maneuver to hover or touchdown at the helipad, these lights may be installed if authorized. The signal derived from this lighting configuration indicates to the pilot the path over which the pilot should fly to hover or touchdown. The lights, when not in paved areas, may be stake mounted. The light nearest the helipad will be in-stalled so that the top of the light will be at the same elevation as the top of the adjacent perimeter light fixture. The tops of the lights in each light bar should be level in the horizontal plane. Where a variation in elevation is necessary, plus 2 percent or minus 1 percent deviation in the longitudinal plane may be permitted.

*c. Approach direction lighting system.* The approach direction lighting system, where provided, will consist of aviation white incandescent light fixtures installed in two parallel rows extending out from the landing direction lights in the approach path to the helipad as shown in figure 43. Each row of approach lights will be 5 feet from the extended centerline of the helipad. These lights will be installed only where it has been determined that approach guidance is required to restrict the approach path to the helipad; or where additional guidance is needed by the pilot in the approach to the helipad; and where authorized for installation. The lights normally will be stake-mounted and have frangible fittings. Each pair of lights will be on 50 foot spacings. The first pair of lights will be located 125 feet from the line of perimeter lights perpendicular to the approach path and will extend 200 feet out from the first pair of lights (fig 43). Only one approach lighting system will be installed at helipad. The lights will be mounted in a horizontal plan, or will follow the slope of the finished grade in the longitudinal gradient above the horizontal plane. The longitudinal gradient should not slope upward more than two percent. Where the slope is below the horizontal, the lights should be mounted in a horizontal plane if practicable, but in no case should the downward slope of the lights exceed 1 percent. Approach direction lights, in line with the landing direction lights, should continue in the same slope as the landing direction lights. Approach direction lights will not be installed without the landing direction lighting

system. The additional approach lights for IMC configurations will be controlled by approach direction lighting system.

*d. Helipad inset lights.* Helipad inset lights (pad inset lights) may be installed in the helipad as an aid in centerline alignment to the pilot while making approach to or touchdown on the helipad. Fixtures will be aviation blue omnidirectional semiflush type and will be located along the pad centerline in the normal direction of approach as illustrated in figure 44. The lights will be installed in the helipad and connected by conduit. The lights will be mounted on light bases designed to be capable of withstanding direct landings of wheel or skid-mounted helicopters without presenting a hazard to the helicopter.

*e. Helipad floodlights.* Helipad floodlights may be installed where authorized, parallel to the normal approach to the helipad. Floodlights should be opposite each other and equidistant from the extended centerline of the helipad, and located not closer than 50 feet from the edge of the helipad

paving (fig 44). Floodlights will be mounted on frangible fittings located as near to grade as the base of the floodlight stand will permit. The overall height of the floodlight above the helipad surface will be kept to a minimum that will permit the proper spread of light on the helipad, but in no case should this height exceed 4 feet above the grade of the helipad. Outside of operational areas, where it is not feasible to remain within the 4-foot limit above the surface of the helipad, the mounting height of the floodlights should be kept to a minimum above the finished grade at the floodlight location. A small obstruction light will be mounted on the top of the floodlight, visible from above and at ground level from any direction around the floodlight.

*f. Refueling area lights.* Explosion-proof aviation light fixture assemblies and associated wiring will be used when lighting fixtures are required within 50 feet of an aircraft fuel inlet or fuel system vent and within 63 feet of an aircraft direct fueling outlet/hose reel pit.

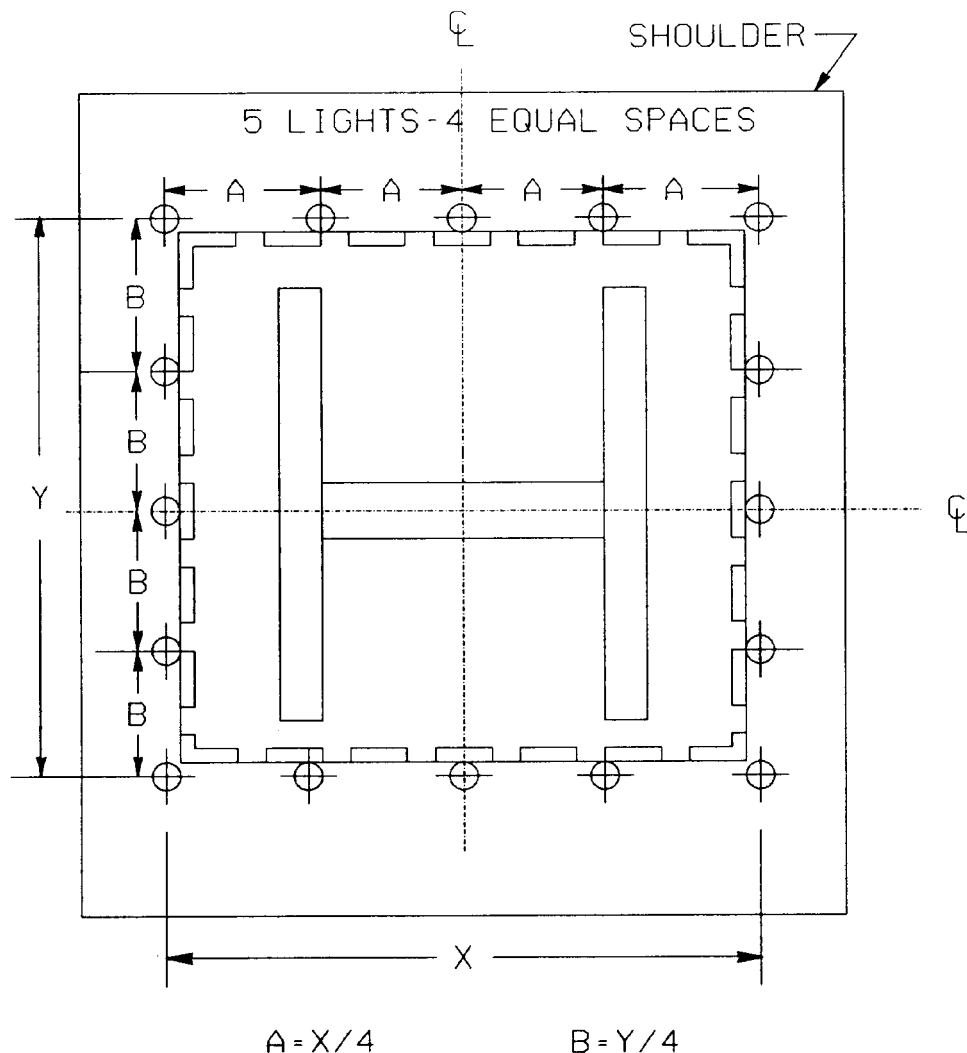


Figure 4-1. Layout of perimeter lighting fixtures.

#### 4-4. Helipad lighting equipment

The types of lighting fixtures used at helipad installations are described below. Each type of light is denoted by a descriptive name, USAF Item No. or FAA No. or Advisory Circular and, where existing, by Military Standard or Military Specification. Mounting accessories are not described or noted herein, but are shown on the installation detail drawings (fig 2-3 and 2-4).

*a. Perimeter lights.* Fixtures for perimeter lighting normally will be mounted on metal light bases as near as practicable to the edge of the helipad paving. Where the shoulders are of sufficient strength to support the metal light bases, the concrete pads around the light bases need not be installed. In areas where the helipad will not be paved, stake mounted lighting fixtures surrounding the touchdown area will be installed.

(1) Elevated perimeter lights will be aviation yellow, omnidirectional, FAA type L-861, provided with a 1-inch bottom hub. The lamps will be 116-watt, 120-volt, with a medium screw base.

(2) Semiflush perimeter lights will be aviation yellow, omnidirectional, class B-3 per Mil. Spec. MIL-L-26202 or AC 150/5345-46 type L-852E class 2 with yellow filter, modified to include a 100-watt to 120-watt, 120-volt lamp with factory installed socket and reflector assembly, mounted on a 10-inch (minimum) deep base.

*b. Landing direction lights.* Fixtures for landing direction lights will be installed in metal light bases when in paved areas and stake-mounted when in unpaved areas. All lights will be installed on frangible fittings. The lights will be aviation yellow and will be as described for perimeter light fixtures above for both elevated and semi-flush fixtures.

*c. Approach direction lights.* Fixtures for approach direction lights will be similar to PAR 56 fixed-wing approach lights. Lamps will be steady-burning.

*d. Helipad inset lights.* Fixtures for helipad (pad) inset lights will be as described for semiflush perimeter lights in a. (2) above, except that aviation blue will be used instead of yellow and the lamps will be 40 watt, 120 volt.

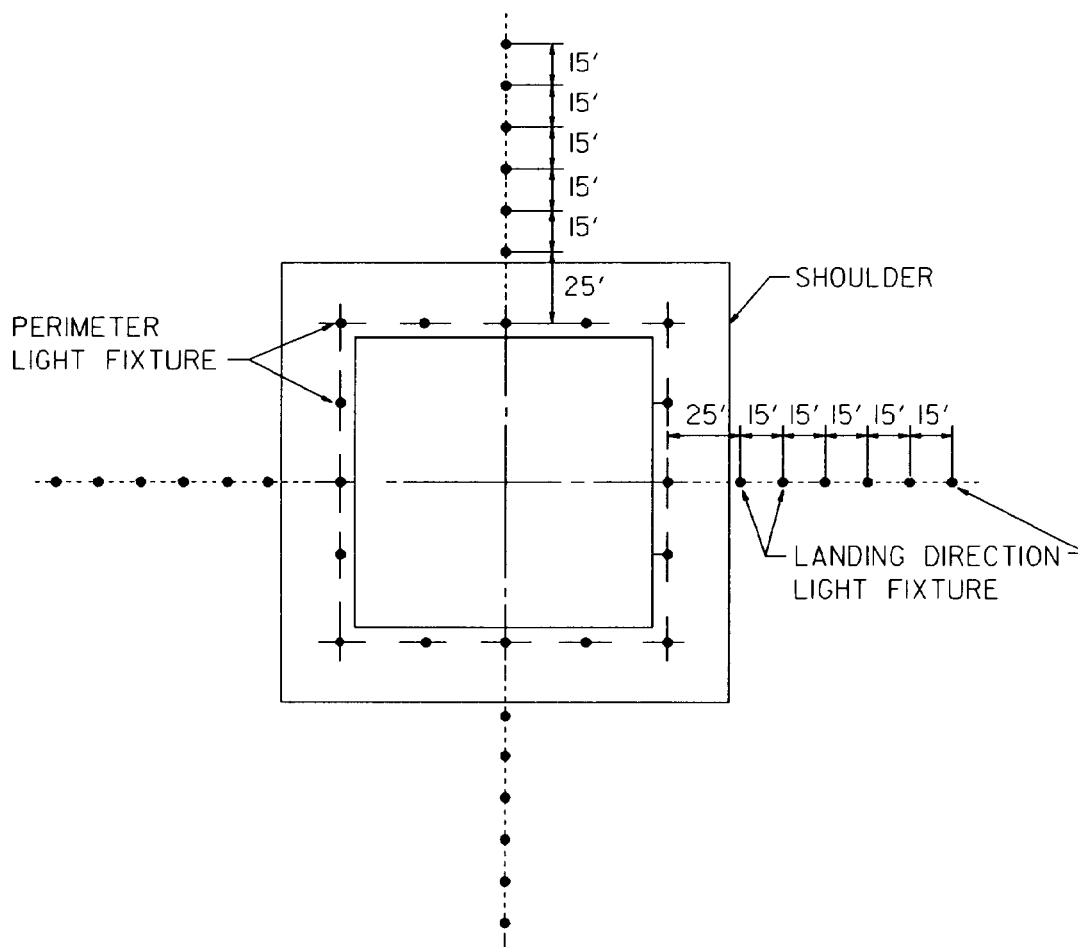


Figure 4-2. Layout of landing direction lighting fixtures.

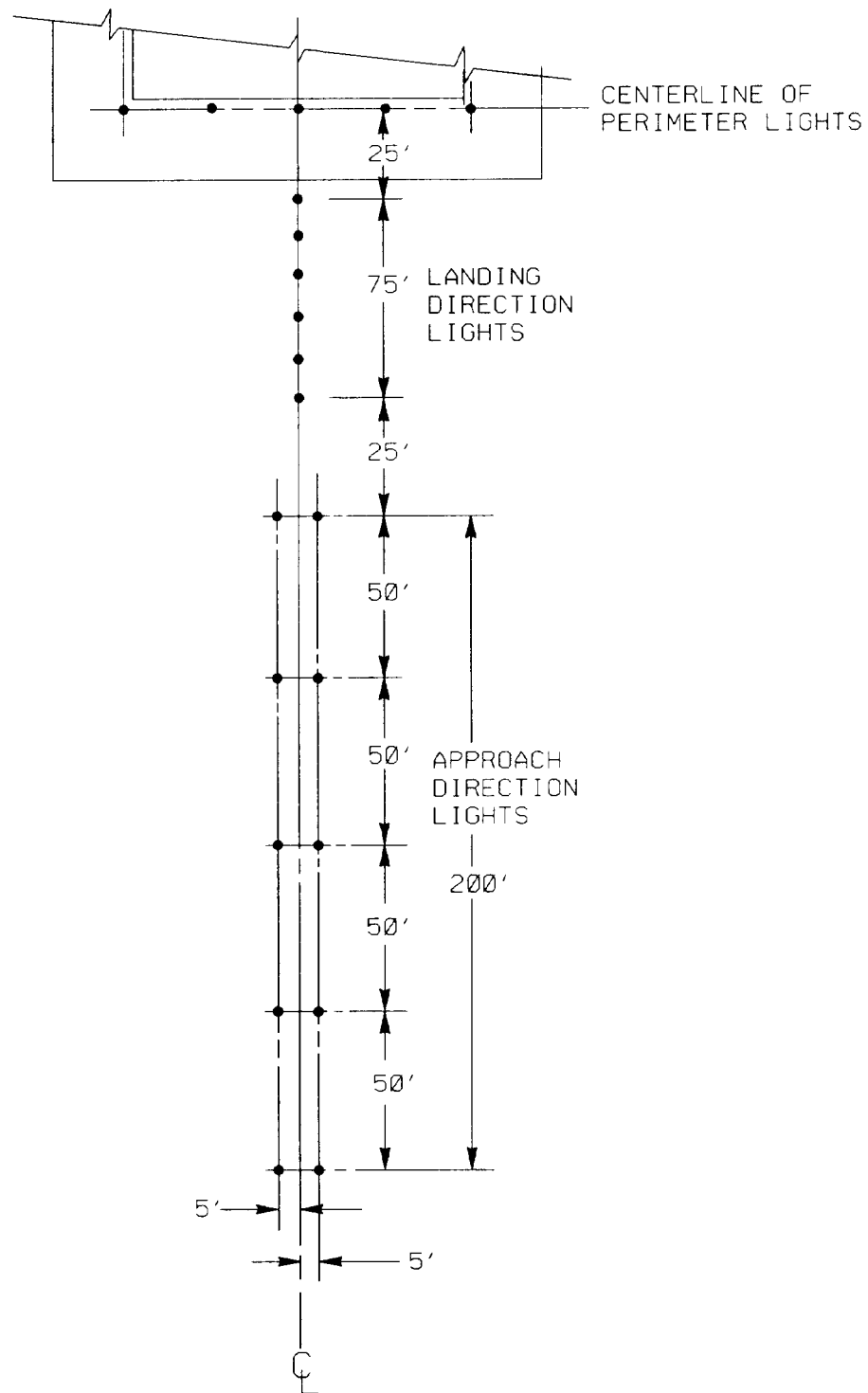


Figure 4-3. Layout of approach direction lighting fixtures.

*e. Helipad floodlights.* Helipad floodlights, except for the red light emitted by the obstruction light mounted on or near each unit, will have no upward component of light, the entire light output being directed below the horizontal. The fixture may utilize one or two lamps, with a total wattage of not more than 500 watts, and will conform to NEMA FA-1. Floodlight will be on an independently controlled circuit. Obstruction light will be controlled separately from floodlights.

*f. Refueling area lights.* Fixture assembly must meet Underwriters Laboratories (UL) test and approval requirements as stated in UL 844 for class 1, division 1, group D hazardous locations as defined in NFPA 70. The fixture assembly will include a light fixture, frangible-coupling, power disconnect switch that will kill power to the fixture if the frangible-coupling is broken, and a junction box. The lens/filter colors will meet MIL-C-25050.

#### 4-5. Helipad lighting power supply and circuits

The components of the helipad lighting system normally will be supplied from multiple circuits. Brightness control

will be varied by use of dimmers located in the structure housing the supply equipment for the helipad lighting system. The dimmers and controls will be described in chapter 10. Control diagrams are illustrated on figure 4-5 and 4-6.

*a. Dimmers.* The number and rating of the dimmers required to control the brightness of the light fixtures in the helipad lighting system will be determined by various components of the lighting system installed.

*b. Conductors.* Cables used for the multiple circuits will be single-conductor or two-conductor, 600-volts, cross-linked polyethylene suitable for direct burial. Conductors will be sized in accordance with the load and length of the circuits so that the voltage drop per circuit does not exceed two percent. Connections to light fixtures will be in accordance with the recommendations of the manufacturer of the light fixtures. No cable splices will be made between fixtures or in any feeders less than 500 feet in length to or from the control structure. Splices in cables, where required, will be in accordance with the recommendations of the cable manufacturer.

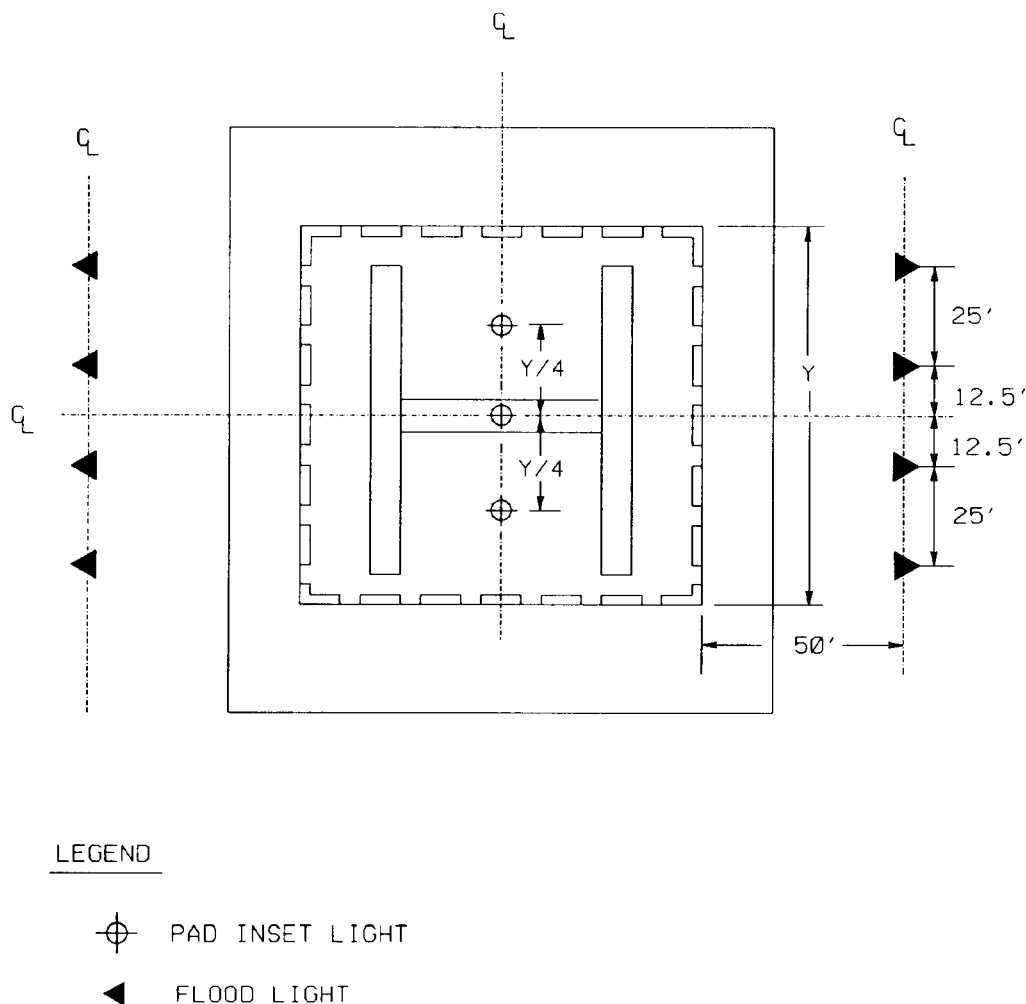


Figure 4-4. Layout of optional floodlights and inset lighting fixtures.

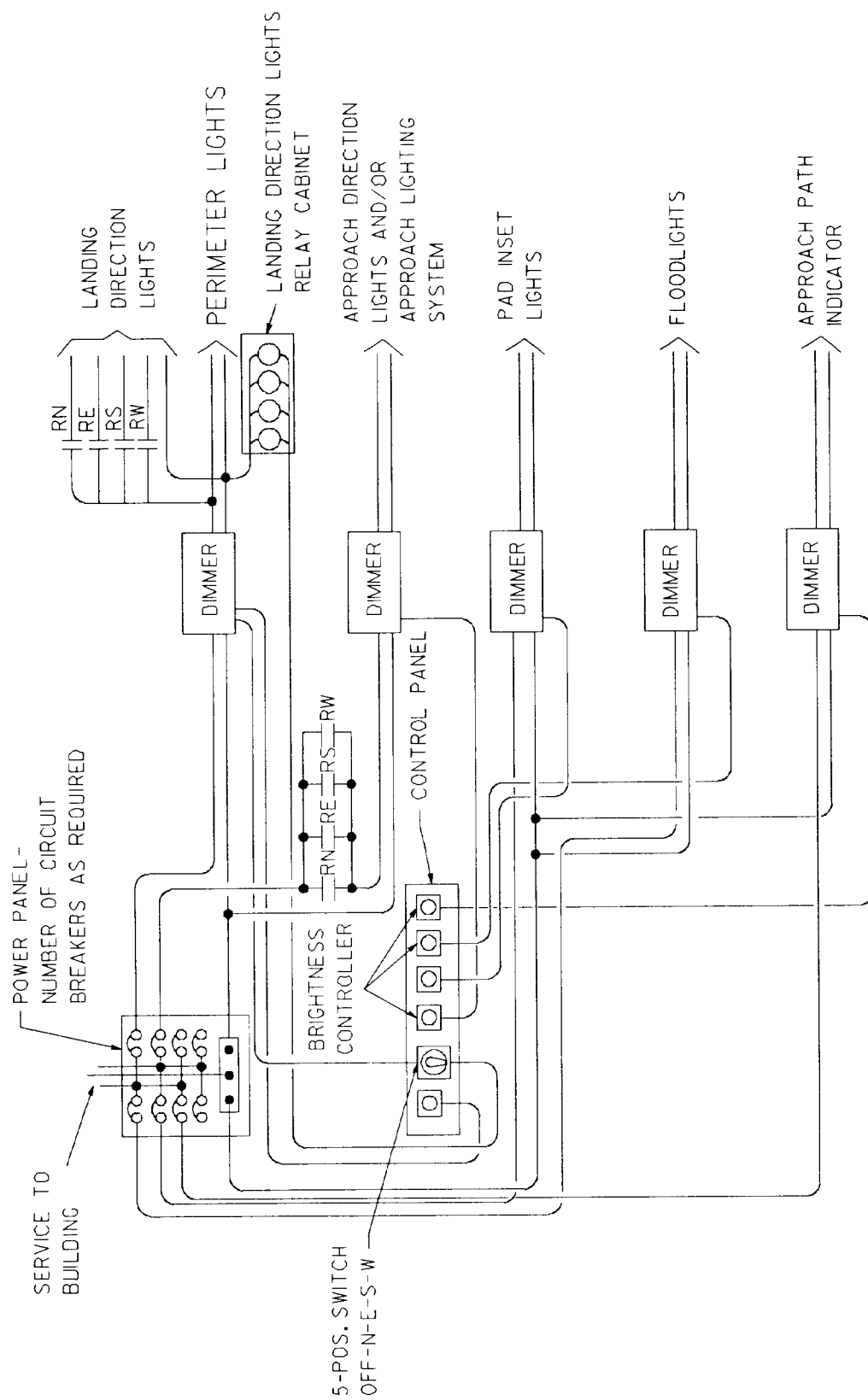


Figure 4-5. Control diagram for helipad lighting (w/o control tower).

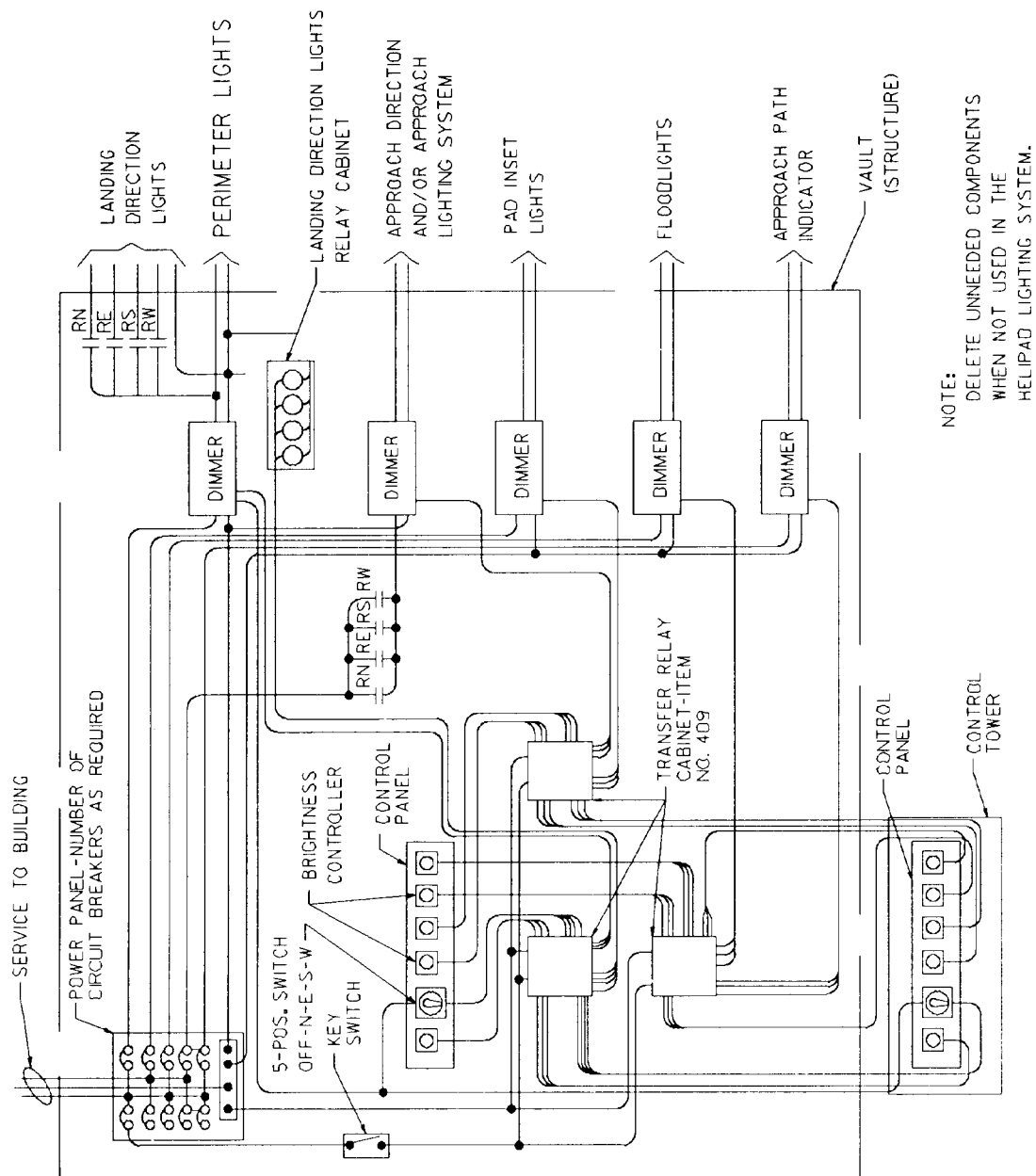


Figure 4-6. Control diagram for helipad lighting (with control tower).